

Master in green energy technology

Study Plan for Master in Green Energy Technology (120 ECTS) (2023–2025)

Facts about the program

ECTS Credits:
120

Study duration:
2 years

Teaching language:
English

Campus:
**Østfold University College, campus
Fredrikstad.**

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Study information

The Master in Green Energy Technology focuses on a sustainable and environmentally friendly approach to energy technology.

The students will acquire knowledge and skills related to renewable energy sources and advanced materials needed to understand the principles of energy generation and storage. The students will also acquire knowledge related to how such energy sources and materials can be interconnected through smart grid and micro grid systems. They will learn how the concept of circular economy can be adapted to energy technology to achieve optimized resource efficiency. Throughout, project work in interdisciplinary groups provides collaboration skills and a better understanding of how each part of an energy system interact together to form an integrated unit.

After successfully completed four semesters, a Master in Green Energy Technology has the competence needed to implement appropriate innovation processes combined with specialized technological knowledge and skills in energy technology and thereby contribute to the development of a more sustainable society.

What do you learn?

Degree/title obtained

Students who complete and pass the programme are awarded the degree of Master in Green Energy Technology

Learning outcomes

A candidate who has completed his or her qualification should have the following learning outcomes defined in the terms of knowledge, skills and general competence:

Knowledge:

For the profile Smart Energy Technology the Candidate:

has specialized insight into power systems, smart-grids and micro-grids and advanced knowledge regarding materials for energy technology, resource shortages and renewable energy sources

has advanced knowledge of experimental and theoretical methods and modelling utilized in green energy technology for power systems, smart-grids and micro-grids, and is able to utilize

his/her advanced and specialized knowledge in new areas.

For the profile Materials for Energy Technology the Candidate:

- has specialized insight into materials for green energy technology and advanced knowledge regarding renewable energy sources, power systems, smart-grids and micro-grids and challenges related to resource shortages
- has advanced knowledge of experimental and theoretical methods and modelling utilized in materials for green energy technology, and is able to utilize his/her advanced and specialized knowledge in new areas.

For both profiles the Candidate:

- is able to understand how societal, political and economic assumptions affect strategies and pathways chosen within debates and decisions regarding future energy technology
- is able to analyze scientific problems within energy technology, and relate this to the history of energy technology and its place in societal debates and strategies, both nationally and internationall.

Skills

The Candidate:

- is able to critically analyze different sources of information and research methods, and use them to structure and develop academic arguments
- is able to analyze and apply different theories within energy technology, and utilize experimental and theoretical methods and modelling within energy technology, and can work independently with practical and theoretical problem solving
- can handle multiple analytical tools to influence politics and strategies and be a contributor in innovation processes, development and decision making related to future energy technology
- is able to independently conduct a defined research or development project under supervision, in agreement with existing ethical norms, and is able to analyze ethical

problems related to green energy technology.

General Competence

The Candidate:

- is able to utilize his/her knowledge and skills within new areas to accomplish advanced tasks and projects, and is able to find relevant scientific literature for new topics within energy technology
- is able to discuss and give oral and written presentations regarding research, and development projects related to energy technology
- is able to collaborate and contribute to team projects, and actively participate in innovation processes related to energy technology.

Admission

The minimum requirements for admission is one of the following:

- 1) Relevant bachelor's degree in engineering or equivalent education of at least 180 ECTS
or
- 2) Relevant natural science bachelor's degree or equivalent education of at least 180 ECTS

To be admitted, the applicant must have an average grade value from the qualifying education of at least 25 (according to ECTS standards).

Proof of English proficiency is also required.

For the profile choice with specialisation in Smart Energy Technology, relevant degrees must be within the fields of electrical engineering, energy technology, electric power systems, computer science, or equivalent.

For the profile choice with specialization in Materials for Energy Technology, relevant degrees must be within the fields of energy technology, materials science, chemistry, chemical

engineering, physics, mechanical engineering, civil engineering, or equivalent.

In addition, all applicants must pass both a written essay and an online entrance test.

Applicants from countries outside the EU/EEA must submit proof of funding when submitting their application.

Structure and content

The structure and content of the programme

The Master in Green Energy Technology is a full-time study program for 2 years (4 semesters).

The master program consists of a combination of compulsory and elective courses.

The student will choose a main disciplinary profile, either Smart Energy Technology or Materials for Energy Technology, when applying to the master program.

During the first semester, the students acquire an interdisciplinary basis and overview within the field of energy technology, preparing them for the more advanced compulsory courses and a specialization profile in the second semester. The chosen disciplinary profile and a broad variation of elective courses in the third semester provides the opportunity for each student to choose their individual field of specialization.

The first three semesters provides the students with understanding, knowledge and skills related to societal issues such as policies and innovation processes, available resources and the use and development of materials and systems for improved energy use. In combination with knowledge and skills related to the logics of scientific work and thinking, this prepares the students for the fourth and final semester, culminating in a Master Thesis on the topic of the chosen specialization.

The first semester is fixed for all students, with three compulsory courses, each of 10 ECTS. These will provide the students with a general interdisciplinary background within green energy technology, teach the students to work in interdisciplinary groups, how to search for scientific literature, and how to present their work both orally and as a written report.

In the second semester, there are 15 ECTS points (5 + 10) compulsory coursework. The 10 ECTS compulsory part will provide the students with knowledge and skills related to how social, political and cultural values affect science, and how more sustainable and lower carbon energy systems can be achieved by implementing innovation and new business models. The 5 ECTS

compulsory part is the first part of the course Scientific Research and Methods, which is completed early in the third semester. This course provides the students with knowledge and skills related to the ethics and logics of academic thinking and writing. The students will also choose their Master Thesis topic and conduct a comprehensive literature study resulting in specific research questions for the Master Thesis, sufficiently framed and defined by state-of-the-art research literature related to their chosen field of interest. In addition to the compulsory part of the second semester, each student choose one of the two specialization profiles as a rule based on their prior bachelor level education, which provided the fulfillment of the admission requirement. Both profiles is constituted by two courses, counting totally 15 ECTS points (5+10), both compulsory for the chosen profile.

To enter the Smart Energy Technology profile, students are expected to possess basic knowledge and skills related to electrical circuits. The Smart Energy Technology profile focuses on the integration of renewable energy sources in power systems, in addition to the concept of micro grids, including modelling and simulations of such.

The Materials for Energy Technology profile focuses on the use and understanding of advanced materials, and how such materials can provide development opportunities related to provident and sustainable technology applications for future energy use efficiency.

The third semester consist mainly of elective courses. There is a 5 ECTS compulsory part of the course Scientific Research and Methods finishing in September, allowing students to exchange to other institutions abroad. The elective courses in the third semester, cover a range of topics related to energy technology, allowing each student to pursue their individual interest. Any combination ensures sufficient learning outcome (except the partial combination Special Curriculum I and II, which is not possible due to course content overlap). Please note that the portfolio of elective courses may change. The execution of elective courses depends on the amount of students enrolled in the course, and will be evaluated by the master GET program management.

The fourth semester consists of a 30 ECTS Master Thesis, where the students will conduct a research/development project related to green energy technology.

Teaching, learning methods and forms of assessment

Forms of teaching and learning:

A combination of different teaching methods are used. Lectures, flipped classroom, seminars, workshops, various types of exercises, laboratory tasks, project work, supervision and self-study are combined to provide the students with the tools they need to obtain the knowledge and skills they will need for the future. Projects in interdisciplinary groups promote collaboration skills, and teach the students to communicate across disciplines. The students will practice both written and oral communication.

During the course of the four semesters, the students will meet guest lecturers from industry and collaborative universities abroad. The study plan provides the opportunity for project work in close collaboration with industry partners. In addition, the students can participate in ongoing research projects at the Department of Engineering. For more details, see heading **Research and development work** below.

The students are expected to work between 750 and 900 hours each semester. In addition to the organized tuition, the students are expected to work independently and in groups with assigned tasks, solve exercises, read the curriculum, find and read other relevant literature, and prepare for exams.

The students will learn how to search for scientific literature and to critically review what they find to acquire new knowledge. This will prepare them for a future where the field of energy technology is advancing towards new technological solutions. They will also obtain skills in various forms of academic writing, as well as in oral presentations.

Teaching materials

The students will work with analogue and relevant digital tools. The students are expected to pay for teaching materials such as textbooks and photocopies themselves. In addition, each student is expected to utilize their own laptop.

Language

The study is internationally oriented, and the tuition language is English. The students are expected to answer all exams in English, and deliver all written work and oral presentations in English.

Coursework requirements and Assessment

Most courses has some compulsory coursework requirements.

The coursework requirements are evaluated on a approved/not approved basis, and should be

approved before the student can take the exams. See the course descriptions for details. The course descriptions also give details about the possibilities for re-taking the assessment if the students fail. Generally, most written or oral exams can be re-taken maximum two times, while written reports can be revised one time. For each course grades are given from A to F, where A is the best grade, E is the lowest passed grade, and F is failed. Exams are graded by two sensors, for most of the courses one of these sensors will be external. An external sensor will always be used on the Master Thesis. The Master Theses is subject to electronic plagiarism control, as may also be the case with other courses and required coursework. Exam papers that are partly or entirely identical will not be approved and will be regarded as attempted cheating. For further information, please see Exam regulations for Østfold University College.

Research and development work

The *Master in Green Energy Technology* is located at the Department of Engineering, Østfold University College, where the employees carry out research related to various aspects of energy technology, such as smart grids, micro grids, materials, and innovation processes. Students are invited to participate with academic staff and guest researchers in professional research projects within and outside the institution. The diversity of the practical and theoretical research of the Department`s employees is one of the main sources of the education at all levels. The research of the academic staff takes place both inside and outside the institution, on a high national and international level. The students will have the opportunity to actively participate in the research projects of the academic staff in the Master Thesis, and to a lesser extent also in some of the other project-based courses. In addition, we have a close contact with the local industry, and the students will have the opportunity to participate in research and development project in collaboration with the industry. The active participation and contributions of the students may take various forms such as practical and theoretical contributions, and sometimes within publications.

Internationalisation

Department of Engineering consists of an international department with different expertise and experience in the international research projects, development and innovation activities and teaching. The Department has an international network with exchange opportunities and appointments with various research and educational institutions.

All courses are taught in English, using solely English literature. This facilitates applicants from outside Norway. Students can also exchange to institutions outside Norway (see "Study Abroad").

Programme evaluation

To be able to offer relevant education of good quality, we are dependent on feedback from the students and on their participation in evaluating the programs of study. Each individual academic environment is responsible for adopting evaluation procedures at course level. See the course descriptions for details.

In addition to course evaluations, Østfold University College conducts periodic evaluations of the study program as a whole. In addition, NOKUT (the Norwegian Agency for Quality Assurance in Education) conduct the annual Student Survey on student perceptions on the quality of study programs in Norway. All students in this study program are given the opportunity to participate in the survey.

Studies abroad

Voluntary exchange / study abroad should normally take place in the 3rd semester and will extend over varying periods of time. Any of the courses in the 3rd semester can be exchanged with other courses abroad, as long as the courses are relevant for the Master and secures sufficient learning outcome. It is also possible to take the Master Thesis abroad in the 4th semester. Exchange/study abroad must be discussed with and approved by supervisors and the program manager.

The Department of Engineering has agreements for internationalization and student exchanges at master's level with the following institutions:

Universidad de Castilla-La Mancha - Spain

Hochschule Wismar - Germany

Queensland University of Technology - Australia

University of North Dakota - USA

University of Pisa - Italy

Högskolan Väst - Sweden

Universidad Politecnica de Cartagena - Spain

University of Vaasa - Finland

Piraeus University of Applied Sciences - Greece

The international coordinator at the Department of Engineering can be contacted for further information.

Work and future studies

Graduates from the Master program form a new and unique generation of professionals who will be called upon to tackle critical issues in renewable and sustainable energy management systems. They are distinguished by their technical and management knowledge and the skills required to deal with a wide range of issues at the interface between energy, technology, innovation and science. With the increasing demand for environmentally friendly and sustainable energy solutions, the industry has a great need of professionals within this field, who are experienced in working in interdisciplinary groups to solve complex problems.

PhD-studies

The study will form the basis for PhD level research, and prepare the candidate for admission to relevant doctoral programs within energy technology. A completed master degree qualifies for admission to related PhD-studies. Examples of such are the PhD program in Mathematics and Natural Sciences at the University of Oslo, PhD in Energy and Process Engineering, or Materials Science and Engineering at Norwegian University of Science and Technology, the PhD program at the Faculty of Engineering and Science at the University of Agder, PhD in Science and Technology at Norwegian University of Life Sciences and the Doctoral Education at the Faculty of Mathematics and Natural Sciences, University of Bergen. Note that one need a B or better average on the Master degree for the admission to PhD-studies at some institutions.

Career prospects

The study focuses on the possibilities and challenges of green energy technology. The study provides competence needed to work within the energy technology sector in both commercial companies, specialized consultancy agencies, policy and regulation defining public bodies and public services. Energy suppliers, energy distributors, and companies manufacturing or supplying energy technology solutions, components, materials, etc. are possible future employers. It is also possible to go into research or teaching, or to start up a new company based on energy technology innovation.

The candidates can work as project engineers, project leaders, or product/concept developers within energy technology. They are attractive employees for a variety of companies and bodies within production, delivery, service, counselling, policy development and administration/management, both nationally and internationally.

The study plan is approved and revised

The study plan is approved

Dean Geir Torgersen 22 August, 2019 Accredited by The Norwegian Agency for Quality Assurance in Education (NOKUT), 28.8.2018.

The study plan is revised

Programme coordinator Susana Garcia Sanfelix, 21.10.2022

The study plan applies to

2023 (autumn)

Programme Coordinator

Faculty of Computer Science, Engineering and Economics.

Department of Engineering, programme coordinator Susana Garcia Sanfelix and program manager Martin Tandberg

Study model

Autumn 2023

Core courses

IRMGR40118 Adapting Technology to the Circular Economy	10 stp
IRMGR40218 Renewable Energy	10 stp
IRMGR40318 Materials for Energy Technology	10 stp

Spring 2024

Profile choices

- Profile choice: Smart Energy Technology
- Profile choice: Materials for Energy Technology

Core courses

IRMGR40518 / Part 1 of 2 Scientific Research and Methods	
IRMGR40418 Energy Technology, Policy and Sustainability	10 stp

Autumn 2024

Core courses

IRMGR40518 / Part 2 of 2	
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Scientific Research and Methods

10 stp

Elective courses (25 ECTS)

IRMGR42018 / Valgbart emne
Power System Dynamic and Control

5 stp

IRMGR42118 / Valgbart emne
Smart Grids Technology and Applications

10 stp

IRMGR42318 / Valgbart emne
Project Development and Funding

10 stp

IRMGR42718 / Valgbart emne
Materials for Energy Efficient Buildings

10 stp

IRMGR42518 / Valgbart emne
Special Curriculum I

10 stp

IRMGR42618 / Valgbart emne
Special Curriculum II

5 stp

Spring 2025

Core courses

IRMGR44018
Master Thesis

30 stp

Last updated from FS (Common Student System) May 2, 2023 10:15:54 AM

Emner som ikke er tatt med

Emnesiden finne ikke

- IRMGR40118 2023h
- IRMGR40218 2023h
- IRMGR40318 2023h
- IRMGR40518 2024v
- IRMGR40418 2024v
- IRMGR41018 2024v
- IRMGR41118 2024v
- IRMGR41518 2024v
- IRMGR41618 2024v
- IRMGR42018 2024h
- IRMGR42118 2024h
- IRMGR42318 2024h
- IRMGR42718 2024h
- IRMGR42518 2024h
- IRMGR42618 2024h
- IRMGR44018 2025v